

**REMARKS**

At page 2, the Office Action indicates that the Information Disclosure Statement filed February 21, 2001 fails to comply with the requirements of 37 C.F.R. §§1.97, 1.98 and MPEP §609 because the references have not been submitted on the proper forms and are photocopies of references from another application. Accordingly, the Office Action indicates that the references referred to have not been considered on the merits.

Reconsideration of this determination is requested. Applicants respectfully submit that the documents cited in the copies of PTO-1449, which are contained in the parent application are entitled to be considered herein, and that it is unnecessary for Applicants to resubmit them, or more particularly, to submit a further Information Disclosure Statement. In particular, Applicants note that MPEP §609 states at Part I (regarding Divisional Applications) that, "the Examiner will consider information which has been considered by the Office in a parent application when examining...(b) a divisional application filed under 37 C.F.R. §1.53(b)...." The present application is a divisional of U.S. patent application serial no. 09/106,220, from which the forms 1449 (submitted with the present application) were copied. Moreover, copies of both forms 1449 (which are attached hereto) bear the Examiner's initials indicating that the references cited therein were in fact considered in the parent application. Under MPEP §609, Applicants are entitled to have them considered in the present application.

Claims 7 through 12 are currently pending in this application, Claim 12 having been added by the foregoing amendment. Claims 7-11 have been rejected under 35 U.S.C. §103(a) as unpatentable over Fong et al (U.S. Patent No. 5,152,976) in view of Matros et al (U.S. Patent No. 5,366,708). However, for the reasons set forth hereinafter, Applicants respectfully submit that all claims of record in this application distinguish over the cited references, whether considered separately or in combination.

The present invention is directed to a gas generation system for generating a high-hydrogen, low-carbon monoxide gas. For this purpose, it is conventional to provide a gas purification stage downstream of a gas generating stage. For example, the gas generating stage may be a reactor for water vapor reforming and/or partial oxidation of methanol, while the gas purification stage may be configured for selective oxidation of carbon monoxide.

A well known problem associated with such devices is that, during starting, the gas generating system must be brought up to the operating temperature in order to function properly. For this purpose, it has been known, for example, to provide electric heating devices in the reformer. Alternatively, a platinum containing catalyst has been used in a separate catalytic combustion stage in which a hot gas is generated whose energy is transmitted in an evaporator to the gas to be reformed prior to its flowing into the reformer. As noted in the specification at page 2, a disadvantage of these systems is the fact

that they require additional components for such heating, particularly during the starting phase.

The present invention addresses this problem and provides a novel arrangement for bringing the system quickly to its proper operating temperature, without requiring separate components such as a heater or a separate catalytic combustion stage. For this purpose, according to the invention, during a starting phase, the sequence of flow of gases through the reforming stage and the purification stage is reversed, with a mixture of fuel and oxygen being supplied to the purification stage, which is thereby operated temporarily as a catalytic burner, as described in the specification at page 3, lines 1-9, and page 9, lines 5-18.

The Fong et al reference, on the other hand, discloses a process for producing "high purity hydrogen" (in this case, "high purity" being defined as at least about 99% pure, as indicated at Column 6, lines 36-37). For this purpose, a refinery offgas feedstock is fed to a partial oxidation unit where it is oxidized to produce a synthesis gas mixture of carbon monoxide and hydrogen. The synthesis gas mixture is then fed to a carbon monoxide shift conversion reactor, where it is reacted with steam to produce a raw gas mixture of carbon dioxide and hydrogen, as described in the specification, for example, at Column 5, lines 3-14. The gas effluent exiting from the shift converter, consisting primarily of raw carbon dioxide and hydrogen, as noted at Column 5, lines 66-68, is then fed

to a Pressure Swing Adsorption Unit, which removes impurities. Thus, according to the disclosure in Fong et al, a method is provided whereby otherwise essentially useless (and indeed problematic) refinery offgas can be processed to produce reasonably pure hydrogen.

The Matros et al reference, on the other hand, discloses an apparatus for gaseous phase catalytic reaction of a feed gas mixture, in which the feed gas is flowed consecutively over two essentially identical reaction zones, each including a catalyst layer, 10b, 12b sandwiched between two heat exchange layers 10a, 10b, 12a, 12b. The structure and function of each of the respective reaction zones relative to the feed gas mixture is identical in that both perform the same catalytic gaseous phase reaction. During the conduct of the reaction, the temperature of the upstream reaction zone is cooled, while that of the downstream reaction zone is heated, due to heat generated in the catalytic reaction process. Periodically, for reasons which are not expressly articulated, the flow direction is reversed, so that heat stored in the reaction zone which was previously downstream (but is now upstream) is transferred to the feed gas mixture.

The purpose of providing dual reaction zones, as shown in Figures 1 through 5 (and as contrasting with the prior art as illustrated in Figure 6) is to facilitate an operating method which prevents unreacted feed gas mixture from

being discharged into the atmosphere. (See Figures 1a-1f, and the discussion at Column 3, line 41 through Column 5, line 48.)

As noted previously, in the Matros et al apparatus, the first and second reaction zones both perform the same catalytic reaction, and Matros et al in fact contains no gas purification stage at all. Accordingly, the elaborate process for reversing the flow direction through the first and second reaction zones suggests nothing with regard to reversal of the flow direction through a device, such as disclosed in the present application, in which a purification stage is situated downstream from a gas generation stage. Moreover, like Fong et al, the Matros et al reference contains no discussion of a startup phase, nor is there any reason given for reversal of the flow direction which would have any relevance to the startup of a two-stage gas generation system such as the present invention.

Accordingly, nothing in either Matros et al or Fong et al suggests a modification of Fong et al which would replicate the present invention. Indeed, given the fundamental differences between the Matros et al apparatus and the Fong et al apparatus (and the apparatus of the present invention), it is not clear exactly how such a modification would be made, or whether such a modification could be made to the Fong et al apparatus. In particular, nothing in either reference suggests such a modification during a startup period.

Claim 7 as amended defines a gas generation apparatus which includes a gas generating device, and a gas purification stage for removing carbon monoxide

from the product gas by means of selective CO oxidation during a normal operation phase of the apparatus. In addition, Claim 7 further recites that feed and discharge pipes are operable during a starting phase of the apparatus for reversing a flow direction through the gas generating device and the gas purification stage, such that "during said starting phase, said gas purification stage operates as a catalytic burner". The latter is not true of either Matros et al or Fong et al, and in fact would not be true of Fong et al, even were the direction of flow reversed as suggested in the Office Action.

Finally, new Claim 12 recites in somewhat greater detail that the second catalytic reactor stage is operable to remove carbon monoxide from the product gas by selective CO oxidation, and operable for catalytic combustion of a mixture of fuel and oxygen. In addition, it also recites that valves are operable during normal operation phase to feed a mixture of fuel and water vapor and/or oxygen "in a first direction, sequentially through said first catalytic reaction stage and thereafter through said second catalytic reaction stage". On the other hand, during a startup phase, the valves are operable to feed a mixture of fuel and oxygen "in a second direction, sequentially through said second catalytic reaction stage and thereafter through said first catalytic reaction stage". The latter features of the invention are neither taught nor suggested by either Fong et al or Matros et al, or by the combination of the two. Accordingly, Applicants respectfully submit that Claims 7 and 12, and therefore all claims of record in this application distinguish over the cited references.

Serial No. 09/781,674  
Amendment Dated: February 10, 2005  
Reply to Office Action Mailed: August 10, 2004  
*Attorney Docket No. 1748X/44438DV*

In light of the foregoing remarks, this application should be in condition for allowance, and early passage of this case to issue is respectfully requested. If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #1748X/44438DV).

Respectfully submitted,

A handwritten signature in dark ink, appearing to read "Gary R. Edwards", is written over a horizontal line.

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Sheet 1 of 1

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Form PTO-1449

U.S. Department of Commerce  
Patent & Trademark OfficeAtty. Docket No.  
1748/44438Serial No.  
Not Yet AssignedApplicant  
MARTIN SCHUESSLER ET AL.Filing Date  
Concurrently HerewithGroup  
1764INFORMATION DISCLOSURE STATEMENT  
(Use several sheets if necessary)

## U.S. PATENT DOCUMENTS

Examiner Initial		Document Number	Date	Name	Class	Sub-Class	Filing Date (if appropriate)
	AA						
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						

## FOREIGN PATENT DOCUMENTS

		Document	Date	Country	Class	Sub-class	Translation Yes   No
RV	AK	44 23 587 C2	01/11/96	Germany	—	—	No
RV	AL	195 44 895 C1	02/27/97	Germany	—	—	No
	AM						
	AN						
	AO						
	AP						

## OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

RV	AQ	Patent Abstracts of Japan, C-186, September 14, 1983, Vol. 7/No. 209, JP 58-108291 (A), June 28, 1983, Ikuo Matsumoto
RV	AR	Patent Abstracts of Japan, JP 08119602 A, October 28, 1994, Tanizaki Katsuji et al.
	AS	

EXAMINER

Rick V. Vane

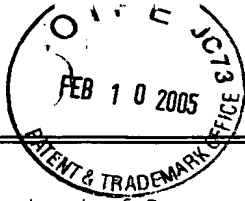
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Form PTO-1449

U.S. Department of Commerce  
Patent & Trademark Office

Atty. Docket No.  
1748/44438

Serial No.  
09/106,220

Applicant  
MARTIN SCHUESSLER ET AL.

Filing Date  
June 29, 1998

Group  
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**INFORMATION DISCLOSURE STATEMENT**  
(Use several sheets if necessary)

**U.S. PATENT DOCUMENTS**

Examiner Initial		Document Number	Date	Name	Class	Sub-Class	Filing Date (if appropriate)
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**FOREIGN PATENT DOCUMENTS**

		Document	Date	Country	Class	Sub-class	Translation Yes   No
RV	AK	195 44 895 C1	02/27/97	Germany	—	—	Abstract
	AL						
	AM						
	AN						
	AO						
	AP						

**OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)**

RV	AQ	Patent Abstracts of Japan, JP 03081969, April 8, 1991, Kumagai Satoshi
RV	AR	Patent Abstracts of Japan, JP 06305702, November 1, 1994, Yamamoto Kazuo
	AS	

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*Pat. V. M...*

DATE CONSIDERED

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